In making a thorough exploration of the larger mound, however, the remains of five human bodies were found, the bones, even those of the fingers, toes, &c., being, for the most part, in a good state of preservation. First, a saucer or bowl-shaped excavation has been made, extending down three and three-fourths feet below the surface of the ground around the mound, and the bottom of this macadamized with gravel and fragments of limestone. In the centre of this floor, five bodies were placed in a sitting posture, with the feet drawn under them, and apparently facing the north. First above the bodies was a thin layer of earth; next above this was nine inches of earth and ashes, among which were found two or three small pieces of fine-grained charcoal. Nearly all the remaining four feet of earth had been changed to a red colour by the long continued action of fire.

All the material of the mound, above and around the bodies, had been made so hard that it was with great difficulty that an excavation could be made even with the best of tools. The soil around the bodies had been deeply stained by the decomposition of the flesh. The first (west) body was that of an average-sized woman in middle life. Six inches to the east of this was the skeleton of a babe. To the north, and in close proximity to the babe, were the remains of a large, aged individual, apparently that of a man. To the east and south of the babe were the bodies of two young though adult persons. The bones of the woman, in their detail of structure, indicated a person of low grade, the evidence of unusual muscular development being strongly marked. The skull of this personage was a wonder to behold, it equalling, if not rivalling in some respects, in inferiority of grade, the famous "Neanderthal skull." The forehead (if forehead it could be called) is very low, lower and more animal-like than in the "Neanderthal" specimen.

This skull is quite small for an adult individual. The inner portions of the brow ridges are slightly prominent.

The distance from the lower portion of the nasal bone to the upper margin of the eye cavities is only four centimetres. A slight portion of this bone has, however, apparently been broken away.

The distance between the eye sockets at a point midway between the upper margin of the eye cavities and the lower portion of the nasal bone is two and three-fourths centimetres. One of the jaws, containing well-preserved teeth, was found. This was rather strong, but the teeth only moderately so. We were at first inclined to consider the strange form of this skull as due to artificial pressure while living, but a critical examination of it revealed the fact that it was normal, *i.e.* not having been artificially deformed. The teeth of the babe were very small, and the skull thick, even for an adult person.

The next skeleton was that of a man nearly six feet in height. The crowns of all the teeth had been very much worn down, some of them even down to the bone of the jaw.

As before stated, the remaining bodies were those of young adult persons, the skull of one of which was small for a full-grown individual. No relics of any description were found with the human remains in this mound. Their burial appeared to be a very ancient one, the limestone fragments in the floor of the excavation being nearly if not all decomposed.

In other mounds opened on the same stream, at Charles City, six miles below, fragments of the same limestone were not infrequently found, but in no case was decomposition visible, except as a thin outer crust, although the human bones, which were usually more or less abundant, were in no case very well preserved, but, on the contrary, often nearly or entirely decomposed. The fine preservation of the remains in the mound at Floyd was due to the method of burial. This being evidenced by the fact that over a small portion of one of the bodies the earth had not been so thoroughly packed, and as a consequence the bones were almost entirely decomposed away, while the other portion of the body over which the soil had been very firmly packed was well preserved. Judging from all the facts gathered, it seems not improbable to suppose that this represented a family burial.

The question has been raised, "How was it that these five persons were all buried here at the same time, their bodies being still in the flesh?" As we have no reason to suppose that these ancient people possessed any means for preserving, for any length of time, in the flesh, the bodies of their dead, it seems plausible to suppose that these individuals were all swept off at about the same time by some pestilence; or else, upon the death of some dignitary of the tribe or people (perhaps represented by the remains of the old man) the other members of the family were sacrificed, similar to the custom which has prevailed among some ancient tribes or races of historic times.

On the same stream, a short distance below this mound, several other mounds occur which promise to yield interesting results, and which we purpose to explore as opportunity offers.

Charles City, Iowa. CLEMENT L. WEBSTER.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 11, 1890.—"Determinations of the Heat Capacity and Heat of Fusion of some Substances to test the validity of Person's Absolute Zero." By S. U. Pickering.

Person made determinations with eight substances to show that the temperature at which their heat of fusion became nil, $t - \frac{l}{C - c}$ (t = temperature of fusion, l = heat of fusion at $t°$, C = heat capacity of liquid, c = heat capacity of solid), was $-160°$ in all cases. This he called the absolute zero. His conclusion may for several reasons be questioned, the chief reason being that he determined C and c at any temperature which happened to be most convenient, and the value of these is largely dependent on temperature: they should both refer to the same temperature, and this is, necessarily, $t°$. The author deduces his values for C and c at $t°$ from determinations made at a series of different temperatures. The substances examined were, sulphuric acid and its monohydrate, hydrated calcium nitrate, and naphthalene, and their temperatures of recrystallization were found to be $-369°$, $-177°$, $-234°$, and $-214°$ respectively, thus refuting Person's conclusion. Benzene was also examined, but the heat capacity of the solid was found to be greater than that of the liquid; this is probably due to an incipient fusion occurring below the temperature of true fusion.

December 18, 1890.—"On the Generic Identity of *Sceparnodon* and *Phascolonus*." By R. Lydekker, B.A. Communicated by Prof. W. H. Flower, C.B., F.R.S.

In the year 1872, Sir R. Owen described two imperfect lower jaws of a large extinct Wombat, from the Pleistocene of Queensland, under the name of *Phascolomys* (*Phascolonus*) *gigas*. Subsequently he described certain imperfect upper incisors, from Queensland and South Australia, characterized by their peculiarly flattened and chisel-like shape, under the new generic name *Sceparnodon*.

In cataloguing the fossil Mammalia in the collection of the British Museum, the author was struck by the circumstance that, while the upper incisors of the so-called *Phascolomys gigas* were unknown, there were no cheek-teeth which could be referred to *Sceparnodon*, and it was accordingly concluded that the teeth described as *Sceparnodon* were probably the upper incisors of *Phascolomys gigas*, and on this supposition it was considered that the latter was generically distinct from existing Wombats, and it was accordingly entered as *Phascolonus gigas* in the Museum Catalogue.

The author now described incisors of *Sceparnodon* and lower jaws of *Phascolonus gigas* obtained at Bingera, New South Wales, from the evidence of which it was concluded that we are now justified in definitely regarding the so-called genus *Sceparnodon* as based upon the upper incisors of the gigantic extinct Wombat known as *Phascolonus*.

Geological Society, December 10.—Dr. A. Geikie, F.R.S. President, in the chair.—The following communications were read:—On some water-worn and pebble-worn stones taken from the apron of the Severn Commissioners' weir erected across the river at Holt Fleet about eight miles above Worcester, by Henry John Marten, Engineer to the Severn Commissioners. The weir referred to in the paper was built in 1844 of soft red sandstone, and some of the stones composing the apron of the weir showing signs of decay were removed in 1887. The average quantity of water passing over each square foot of the stones composing the apron has been estimated at about 2000 gallons per minute. A large proportion of the stones had been drilled through and through by the action of the current upon small pebbles lodged in hollows or between the joints of the stone; and the author estimates that, as a result of 43 years of erosion, six of the stones of the apron, which may be taken as a sample, had lost the following amounts respectively: 45, 60, 48, 50, 37, and 58 per cent. In answer to various questions, the author said he believed the action was principally abrasive, as there was only a small proportion of lime in the stone which would be the subject of chemical action. The weir was placed diagonally across the river, and the stones referred to, which were average samples, were taken from the apron at the upper end of the diagonal, where the abrasive effect appeared to be greatest. The pebbles were principally of quartzose description. The rock from which the stones were taken was of a homogeneous character. In the case of stone No. 1, had the action been uniform, the abrasion would represent a loss of nearly one foot three inches from the surface of the stone as originally placed in the apron, and the others in proportion.—On the physical geology of Tennessee and adjoining districts in the United States of America, by Prof. Edward Hull, F.R.S., late Director of the Geological Survey of Ireland. The area described in the paper is occupied by the Unaka or Blue Ridge, which may be regarded as one of the parallel ridges of the Alleghanies, and the prolongation of Prof. J. D. Dana's "Archæan Protaxis." It runs in a general south-westerly direction, and attains an elevation of 6760 feet. At its base, and to the north-west of it, is the Valley of East Tennessee, about 40 miles wide, and furrowed by north-east and south-west ridges and depressions, parallel to the strike of the Cambrian and Silurian beds. Through this runs the Tennessee River, which, instead of running south to the Gulf of Mexico, turns to the north-west, some distance below Chattanooga, and cuts through the Cumberland table-land, a prolongation of the Appalachian Mountains, and flows into the Ohio River. The Cumberland table-land has an average height of 2000 feet above the sea, and 1350 feet above the Tennessee River at Chattanooga. It consists of a synclinal of Carboniferous rocks resting conformably upon the Devonian beds, and is bounded along the East Tennessee Valley by a curved escarpment; a similar though more indented escarpment forming its north-western margin, and separating it from the Silurian plain of Nashville. The table-land is about 40 miles wide, and is intersected by the Valley of the Sequachee River, running in a north-easterly direction along a subsidiary anticline from near Jasper for a distance of 60 miles. From the base of the Cambrian beds, the whole Lower and Upper Palæozoic formations succeed each other in apparently conformable sequence, except at the junction of the Upper and Lower Silurian series, where a probable discordance occurs. The prolonged period of subsidence and deposition at length gave way to elevation; acting with the greatest effect along the Alleghanies. Under these circumstances, denudation proceeded most rapidly along the tract bordering the Protaxis, whilst the synclines were protected from erosion to a greater degree; and as the elevatory movement was more rapid along the Unaka range, the flow of the streams was generally westward. At a later period the Cumberland plateau began to be formed by backward erosion of the strata in the direction of the dip; so that it owes its development to the erosion of the Tennessee and Clinch Rivers on the one hand, and to the Cumberland River on the other. Where the Tennessee River flows in a north-westerly direction through the Cumberland plateau, the divide between it and the Gulf of Mexico is only 280 feet above the river-bed, whilst the table-land is 1400–1500 feet above. The author infers, therefore, that when the river began to erode its channel the plateau was relatively lower than the tract to the south of the present course of the stream, but that by denudation the relations have been reversed, whilst the river has never left its originally selected course. The author compares the state of things with that which must have occurred in the case of the northerly rivers running from the centre of the Wealden axis; but mentions that Prof. Safford and Mr. J. Leslie account for the Cumberland plateau by faulting, though he thinks that the well-defined escarpment along the Valley of East Tennessee seems to show that this cause is insufficient. In conclusion, he believes that the denudation was accelerated during the pluvial or "Champlain" period, and calls attention to the "Columbia formation" of the east side of the Alleghanies, and to the deposit of red loam by which the surface of the country of the valleys of the Tennessee and Sequachee is overspread, and which is probably referable to a similar stage. After the reading of the paper there was a discussion, in which Mr. Topley, Prof. Hughes, Mr. Wills, Dr. Hyland, and the President took part. The President found difficulties here, as elsewhere, in realizing the form of the ground when the rivers began to flow, and in discovering whether there were subterranean movements which affected the denudation. He felt that the explanation of the topography might not be so simple as Prof. Hull made out, and would like to have more details as to the structure of the ground. The author, in reply, concurred with the remarks of the President as to the complex character of the subject.—On certain Ornithosaurian and Dinosaurian remains, by R. Lydekker.

Royal Meteorological Society, December 17, 1890.—H. F. Blanford, F.R.S., Vice-President, in the chair.—The following papers were read:—Note on a lightning stroke presenting some features of interest, by R. H. Scott, F.R.S. On January 5, a house near Ballyglass, Co. Mayo, was struck by lightning, and some amount of damage done. A peculiar occurrence happened to a basket of eggs lying on the floor of one of the rooms. The shells were shattered, so that they fell off when the eggs were put into boiling water, but the inner membrane was not broken. The eggs tasted quite sound. The owner's account is that he boiled a few eggs from the top of the basket, the rest were "made into a mummy," "the lower ones all flattened, but not broken."—Note on the effect of lightning on a dwelling-house, by A. Brewin. This is an account of the damage done to the author's house at Twickenham on September 23.—Wind systems and trade routes between the Cape of Good Hope and Australia, by Captain M. W. C. Hepworth. The author is of opinion that the best parallel on which commanders of vessels navigating the South Indian Ocean between the Cape of Good Hope and the Australian colonies should run down the longitude is between the 41st and 42nd parallels during the winter months, and between the 45th and 46th parallels during the summer months.—Report on the phenological observations for 1890, by E. Mawley. Taking the year ending August, the weather of the autumn, winter, and spring, and of the first summer month could scarcely have been more favourable for vegetation, while that of July and August proved altogether as unpropitious.—The climate of Hong Kong, by Dr. W. Doberck. This is a discussion of the meteorological results at the Hong Kong Observatory, and at the Victoria Peak, during the five years 1884–88.

CAMBRIDGE.

Philosophical Society, November 24, 1890.—Prof. G. H. Darwin, President, in the chair.—The following communications were made:—On the beats in the vibrations of a revolving cylinder or bell, and their bearing on the theory of thin elastic shells, by Mr. G. H. Bryan. It is well known that if a vibrating rod of circular section is rotated upon its axis the plane of vibration remains fixed in space instead of turning round with the rod—an experiment frequently used to illustrate the corresponding property of polarized light. If, on the other hand, a tuning fork is rotated, beats will be heard which indicate that the planes of vibration turn with the fork. In this paper it is shown that when a bell or other body symmetrical about an axis is vibrating, and at the same time revolving about that axis, an intermediate effect will in general be observed. The nodal meridians will rotate, but with a smaller angular velocity than the body. This is in the first place proved from general considerations for the case of a rotating ring or cylinder, which, as in the investigations of Hoppe and Lord Rayleigh, is supposed inextensible to the first order of small quantities. In the mathematical investigations which follow, the purely statical effects of centrifugal force are separated more easily by supposing the ring to be also acted on by an attraction to the centre proportional to the distance. Taking the type of vibration which has $2n$ nodes, the author finds that these nodes rotate about the axis with angular velocity

$$\frac{n^2-1}{n^2+1}\,\omega,$$

where ω is the angular velocity of the ring. The number of beats heard per revolution of the ring will therefore be

$$2n\,\frac{n^2-1}{n^2+1},$$

instead of $2n$, which would be the number if the nodes were to rotate with the ring. Putting $n = 2, 3$, &c., we find the numbers of beats per revolution corresponding to the successive tones to be 2·4, 4·8, 7·059, 9·231, 11·351, &c., approximately. The results of experiment were found to agree fairly closely with theory.—On liquid jets, by Mr. H. J. Sharpe.—Notes on the application of quaternions to the discussion of Laplace's equation, by Mr. J. Brill.—On a simple model to illustrate certain facts in astronomy, with a view to navigation, by Dr. A. Sheridan Lea.—Note on a paper in the Society's Proceedings, by Mr. W. Burnside.

Philadelphia.

The Franklin Institute, November 18, 1890.—Chemical Section.—Alloys of sodium and lead, by Wm. H. Greene and Wm. H. Wahl. Recently, in the course of certain investigations, in which we had occasion to make use of alloys of lead and sodium, we found that the properties of such alloys did not correspond with what we had anticipated from previous publications on the subject, and we were led to an examination of the properties of lead-sodium alloys of definite composition. These alloys may easily be made by direct combination, and the products are then sensibly constant in composition, which is not the case when they are prepared by reducing lead oxide by carbon in presence of soda, or by heating litharge with sodium tartrate, as described by Vanquelin and Serullas. The required quantity of sodium was added to lead melted in a covered crucible, and the alloy was roughly analyzed by determining lead only. Our alloys contained from 3 to 31 per cent. sodium. They are all brittle and crystalline; all decompose water, that containing the least sodium producing a hardly perceptible evolution of gas, while that containing 31 per cent. reacts with violence. The brittleness and oxidability increase with the percentage of sodium. The richest alloy is greenish in colour, and instantly blackens on exposure to air. We made special examinations of the alloys corresponding in composition to Na_2Pb_2, Na_2Pb, and Na_4Pb: the first of these contained 10 per cent. sodium, the second 19·5 per cent., rather more than would be indicated by the formula, while the last contained 31·7 per cent. The densities were determined in aniline, and found to be considerably higher than would be the densities of mixtures of the same composition. Thus the 10 per cent. alloy has a density of 6·91, the 19·5 per cent. a density of 4·61, and the 31·7 per cent. alloy a density of 3·81. The densities of corresponding mixtures would be 5·6, 3·7, and 2·7 respectively. The theoretical and calculated percentages of Na in alloys of above assumed composition compare as follows:—

	Na_2Pb_2.	Na_2Pb.	Na_4Pb.
P.C. Na by theory … … …	10	18·18	30·8
,, found … … … …	10	19·5	31·7

Paris.

Academy of Sciences, December 22, 1890.—M. Hermite in the chair.—On the history of the hydrostatic balance, and some other pieces of apparatus and scientific processes, by M. Berthelot.—On the ultra-violet limit of the solar spectrum, from photographs obtained by Dr. O. Simony at the summit of the Peak of Teneriffe, by M. A. Cornu. The author discusses some photographs of the solar spectrum obtained at Teneriffe, in relation to others taken at Courtenay, for the purpose of determining the influence of the atmosphere on the ultra-violet region. The following is a comparison of results:—

Photographs obtained at	Altitude. Metres.	Wave-length	
		of the last trace of the spectrum.	of the beginning of the end.
Teneriffe …	3700	292·2	293·7
Courtenay …	170	284·8 (U)	298·0

—Contribution to the natural history of the truffle, by M. Ad. Chatin.—On minima surfaces, by Prof. A. Cayley.—Singular case of germination of the grains of a Cactacea in their pericarp, by M. D. Clos.—Improvement of the culture of the potato, for industrial and fodder purposes, in France, by M. Aimé Girard.—Meteoric period of November 1890, by M. P. F. Denza. (See Our Astronomical Column.)—On the normals to quadrics, by M. Georges Humbert.—Electro-magnetic resolution of equations, by M. Félix Lucas.—Researches on refraction and dispersion in an isomorphous series of crystals having two axes, by M. Fr. L. Perrot. The substances investigated are the double salts formed by the combinations of sulphate of zinc with sulphates of the metals K, Rb, Cs, Tl, and the group NH_4. It is shown that, with the exception of the ammonium salt, the index of refraction increases with the molecular weight.—On a new series of ammoniacal compounds of ruthenium, derived from $RuNOCl_3$, by M. A. Joly.—On the combinations of ammonia with the chlorides and bromides of phosphorus, by M. A. Besson.—A method for obtaining pure phosphoric acid, in solution or in the vitreous state, by M. M. Nicolas.—Colour reactions of aromatic amines, by M. Ch. Lauth.—New process for the detection of fraud in olive oils, by M. R. Brullé.—Experimental researches on cow vaccine, by MM. Straus, Chambon, and Ménard.—Physiological action of morphine on the cat, by M. L. Guinard.—On the action of motor nerves during the desiccation of muscles, by M. N. Wedensky.—On the dimorphism of males of Crustacea amphipoda, by M. Jules Bonnier.—On the reproduction of autolyte, by M. A. Malaquin.—On the apidological fauna of South-West France, by M. J. Pérez.—The relations between the actual deformation of the earth's crust, and the mean densities of rocks and of the waters of seas, by M. A. Romieux. The relation discussed is that between the volume and density of the waters on the earth and that of the land surface.—On the geological history of the Sahara, by M. Georges Rolland.—On the soundings of the lake of Annecy, by MM. A. Delebecque and L. Legay.—On millerite from Morro-Velho, in the Minas Geraes province, Brazil, by Dom Pedro Augusto de Saxe-Cobourg-Gotha.—On offretite, a new mineral, by M. Ferdinand Gonnard.—On the rocks inclosed in trachyte from Menet (Cantal), and on their modifications and origin, by M. A. Lacroix.—On the distinction of two ages in the formation of dunes at Gascogne, by M. E. Durègne.—The tornado of August 18, 1890, in Brittany, by M. G. Jeannel.

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